

REMARKS

In the Office Action, the Examiner rejected Claims 1, 4-7, 11, 12, 15, 17-19 and 21, which were all of the then pending claims, over the prior art, principally U.S. Patent 6,721,941 Morshed). More specifically, Claims 1, 4-7, 15 and 17-19 were rejected under 35 U.S.C. 102 as being fully anticipated by Morshed; and Claims 21, 11 and 12 were rejected under 35 U.S.C. 103 as being unpatentable over Morshed in view of U.S. Patent 6,839,893 (Bates). The Examiner also objected to informalities in Claims 1, 4-7, 15 and 19.

Independent Claims 1 and 15 are being amended to better define the subject matters of these claims. Also, the rejection of Claims 12, 11 and 12 is respectfully traversed.

Claims 1, 4-7, 15 and 19 are being amended to address the Examiner's objections to these claims. For instance, in line 2 of each of Claims 1 and 15, "monitoring the behavior of a running computer program" is being changed, as the Examiner suggested, to "monitoring behavior of a running computer program." The first line of each of Claims 4-7 is being changed, again as the Examiner suggested, from "A tool" to "A software tool." Claim 19 is being amended to be dependent from Claim 15 instead of the now cancelled Claim 16.

In view of the foregoing discussion and the changes being made herein, the Examiner is asked to reconsider and to withdraw the objections to Claims 1, 4-7, 15 and 16.

In addition, for the reasons advanced below, Claims 1, 4-7, 11, 12, 15, 17-19 and 21 patentably distinguish over the prior art and are allowable. The Examiner is thus respectfully requested to reconsider and to withdraw the rejection of Claims 1, 4-7, 15 and 17-19 under 35 U.S.C. 102 and the rejection of Claims 21, 11 and 12 under 35 U.S.C. 103, and to allow Claims 1, 4-7, 11, 12, 15, 17-19 and 21.

Applicants will first address the rejection of Claims 1, 4-7, 15 and 17-19, and will then discuss the rejection of Claims 21, 11 and 12.

Claims 1, 4-7, 15 and 17-19

Generally, Claims 1, 4-7, 15 and 17-19 patentably distinguish over the prior art because the prior art does not disclose or render obvious the way in which the pattern detector manager invokes the pattern detectors to insert additional breakpoints into the computer program as described in independent Claims 1 and 15.

The present invention relates to the automatic detection of problematic coding patterns and violations of best practices patterns at program runtime. As discussed in detail in the present application, in any large software deployment, subtle coding defects can cause problems in successful deployment of the software. Tracking down these defects may be extremely difficult in the production environment because of a number of factors.

One factor is that, in many cases, the symptoms are usually not unique to a particular type of software defect. This makes correlating symptoms to specific defects nearly impossible. Another factor is that many symptoms may manifest themselves only during production level loads and production configurations. This means that the defects are often undetected in the testing and debugging of software. In addition, the reasons why a piece of code is defective are often complex and may span third party libraries and frameworks.

The present invention effectively addresses these issues. Generally, this is done by observing the behavior of a running program within the context of a large number of defined coding patterns, and automatically flagging violations of the coding patterns when they occur. More specifically, in accordance with one embodiment of the invention, a software tool is provided for monitoring the behavior of a running computer program for code patterns that violate a given set of coding rules. This software tool comprises a pattern detector manager and a plurality of individual pattern detectors.

The pattern detector manager is provided for inserting a main entry breakpoint at one or more defined points in the computer program. When any of these breakpoints are hit during the running of the computer program, the pattern detector manager invokes each of the pattern detectors to insert additional breakpoints into the computer program to identify steps in defined coding patterns associated with those pattern detectors. These pattern detectors track the inserted, additional breakpoints to detect violation of those defined coding patterns.

The prior art does not disclose or render obvious the use of the pattern detector manager in the manner described above.

In particular, Morshed, et al. which is the only reference relied on to reject Claims 1, 4-7, 15 and 17-19, discloses method and system for monitoring execution of an application in a computer system. In the procedure described in this reference, debugging information is reported to a program monitor using an application debugging interface, and program execution information is gathered using the debugging information to monitor execution of the application.

One specific operation of a virtual machine is discussed in columns 21-23 of Morshed, et al. In this operation, a computer code is tested to see if various lines or instructions have been reached. If these tests are positive, various instruments are instrumented, as represented in Fig. 14.

There are a number of important differences between the above-discussed embodiment of the present invention and the procedure disclosed in Morshed, et al.

One important difference is that with the present invention, when a defined main breakpoint is hit, the pattern detector manager invokes the patterns detector to insert additional breakpoints. These pattern detectors then insert those additional breakpoints, and monitor these additional breakpoints for violation of coding rules. With this procedure, the additional breakpoints are not in the computer program until the pattern detector manager invokes the pattern detectors. In contrast, with the procedure disclosed in columns 21-23 of Morshed, et al, the lines or instructions for which the program is tested are, if they are in the program at all, are always in that program.

The procedure of the embodiment of this invention has an advantage because those additional breakpoints do not slow down the running of the computer program until they are inserted, which only occurs after the pattern detector manager invoked the pattern detectors to insert those breakpoints.

Independent Claims 1 and 15 are being amended to describe the above-discussed feature of an embodiment of the invention. More specifically, these claims are being amended to describe the features that the pattern detector manager inserts into the computer program a main entry breakpoint at one or more defined point in the computer program; and upon hitting one of these entry breakpoints in the computer program, the pattern detector manager invokes each of the pattern detectors to insert additional breakpoints into the computer program to identify steps in a group of defined coding

patterns. Claims 1 and 15 further describe the feature that the pattern detectors track these inserted, additional breakpoints to detect violations of those defined coding patterns.

The other references of record have been reviewed, and these other references, whether considered individually or in combination, also do not disclose or suggest the use of a pattern detector manager and a plurality of pattern detectors, as described above.

Because of the above-discussed differences between Claims 1 and 15 and the prior art, and because of the advantages associated with those differences, Claims 1 and 15 patentably distinguish over the prior art and are allowable. Claims 4-7 are dependent from Claim 1 and are allowable therewith; and Claims 17-19 are dependent from, and are allowable with, Claim 15. Accordingly, the Examiner is asked to reconsider and to withdraw the rejection of Claims 1, 4-7, 15 and 17-19 under 35 U.S.C. 102, and to allow these claims.

Rejection of Claims 21, 11 and 12

The rejection of Claims 21, 11 and 12 is respectfully traversed because Bates, et al, which is relied on for the rejection of each of these claims, cannot be applied, under 35 U.S.C. 103, to reject the claims of the present application. This is because Bates, et al. and this application are assigned to the same corporation, IBM Corporation. Applicants submit that the filing of the present application on September 25, 2003, brings the subject application under the rubric of the amendments made to the Patent Law in the American Inventors Protection Act of 1999. That Act, enacted November 29, 1999, amends 35 U.S.C. §103(c) such that subject matter developed by another person which qualifies as prior art under 35 U.S.C. §102(e) does not preclude patentability where the subject matter and the

claimed invention were, at the time the invention was made, owned by the same person or subject to an application of assignment to the same person.

That this section applies to the instant application is established by the Guidelines concerning the implementation of changes to 35 U.S.C. §§102(g) and 103(c) published in the Official Gazette on April 11, 2000. Those Guidelines includes the statement that the amendment to 103(c) applies to all utility, design and plant patent applications filed on or after November 29, 1999, including continuing applications filed under 37 C.F.R. §1.53(d), continued prosecution applications filed under 37 C.F.R. §1.53(b) and reissues. In view of the filing of the present application on September 25, 2003, Applicants benefit from the statutory restraints imposed in the amendment to §103(c).

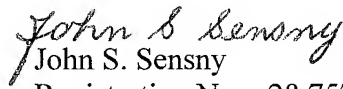
That Claims 21, 11 and 12 of the present application are patentable over the rejection of record is established by the fact that Bates, et al. is, on its face, assigned to International Business Machines. The instant application is also assigned to International Business Machines. The Assignment of the instant application to International Business Machines was recorded by the USPTO on September 25, 2003, at Reel 014545, Frame 0970. A copy of the Patent Assignment Abstract of Title is attached herewith for the convenience of the Examiner.

U.S. Patent 6,839,893 to Bates, et al. issued January 4, 2005. The present application is entitled to the filing date of September 25, 2003. As such, the outstanding rejection of Claims 21, 11 and 12 of the present application applies the Bates, et al. patent predicated upon its availability as a reference under 35 U.S.C. §102(e) in that this is the only subsection of 35 U.S.C. §102 whose requirements are met by this patent.

In view of the requirements of 35 U.S.C. §103(c), as amended November 29, 1999, which apply to the instant application, the Bates, et al. reference cannot preclude patentability under 35 U.S.C. §103, the section upon which Claims 21, 11 and 12 of the present application have been rejected. Thus, these claims of the present application are patentable over the outstanding rejection of record. Reconsideration and removal of this ground of rejection is therefore deemed appropriate. Such action is respectfully urged.

For the reasons set forth above, the Examiner is respectfully requested to reconsider and to withdraw the objections to Claims 1, 4-7, 15 and 16, the rejection of Claims 1-4, 7, 15 and 17-19 under 35 U.S.C. 102, and the rejection of Claims 21, 11 and 12 under 35 U.S.C. 103. The Examiner is further asked to allow Claims 1-4, 7, 11, 12, 15, 17-19 and 21. If the Examiner believes that a telephone conference with Applicants' Attorneys would be advantageous to the disposition of this case, the Examiner is asked to telephone the undersigned.

Respectfully submitted,


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Attachment: Copy of Patent Assignment Abstract of Title